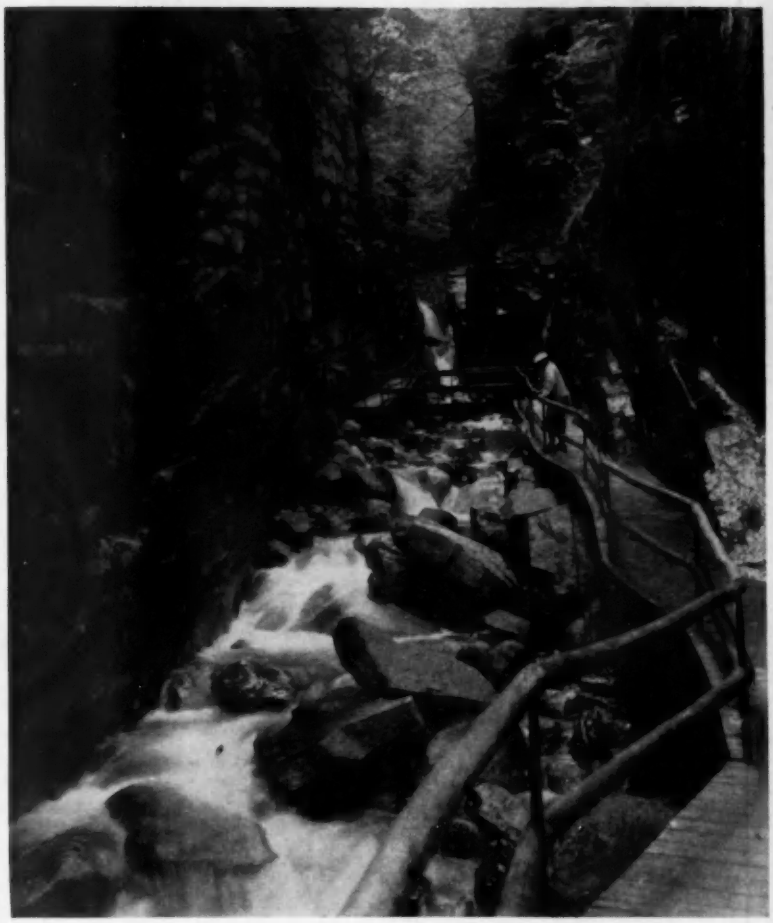
Earth Science

Rockhounds' NATIONAL Magazine



The Flume at Franconia Notch, leading to the Basin and view of the Great Stone Face. (See page 12)

35¢

July - August, 1955

The great URANIUM rush is on!

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Earth Science

$2 a Year

Vol. 8, No. 4

Official Publication of the Midwest Federation of Mineralogical Societies

CONTENTS, JULY-AUGUST, 1955

EDITOR'S MEMO PAD

BASICALLY, Earth Science in its broader aspect has much to offer its devotees. Each individual, regardless of the pattern he pursues, should derive from it benefits such as are afforded by few other hobbies. Let us now examine this premise in further detail.

For example, if he is in need of self assurance, Earth Science will give it. It will also furnish him with a satisfying world picture of living, and likewise a workable philosophy of life. It will provide him with personal interests, and an appreciation of esthetic values in a manner both outstanding and unique among most avocations.

How can Earth Science do all of these many wonderful and worthwhile things? In the understanding of our "world picture of living," it furnishes him with functional information, facts, ideas and concepts concerning Man's physical environment, and teaches him how, as an individual, Man's activities and his destinies are largely determined by the conditions under which he lives.

A careful study and observation of Nature's *modus operandi* not only will assist him in developing attitudes and skills, but also methods for solving many of the more perplexing or baffling problems of life. It will aid in the developing of his esthetic taste to the place where interest in living and in the beauties of the great out-of-doors will be largely enhanced.

The pursuit of new and interesting Earth Science experiences and other related leisure time activities, (travel for instance), cannot help but increase and stimulate one's joy in living. Whether it be the collecting or the identification of rocks and minerals, beautifying them by means of the lapidary arts, or any other of the more popular forms of geologizing, it is all to the good, and we can recommend it unqualifiedly.

Lucky is the man who owns a good geology hammer, knows how and is not afraid to make use of it.

*

American Federation Emblem

After several years of continuous effort we are happy to announce that one of the American Federation projects which has been strongly supported by the Midwest Federation has come to fruition, thanks to the untiring work of our good friend Charles Preston, who has served as chairman of the American committee on emblems. At long last our car emblems are completed and are now on the market.

The emblem is made of metal with nicely colored letters, and can be attached with the furnished accessories to the rear bumper of your car. Thus you may identify yourself to other rockhounds as you travel along through distant parts of the country on your vacation trips, or your journeys to your favorite collecting spots or other places of interest. "Watch the car ahead of you, he may be a rockhound!"

These emblems may be obtained through your local club or society at nominal cost (50c each), provided your club is affiliated with one of the regional federations of the American Federation. All Midwest clubs should forward their group orders at once through club secretary, to Federation Treasurer, O. M. Fether, 818 Birch Street, Downers Grove, Illinois, who will mail the emblems promptly. Remittances should accompany the orders.

*

Authors

Charles and *Mabel Bass* are ranchers at Jay Em, Wyoming. Photo by Lloyd M. Peterson. *Henry P. Zuidema* is a consulting geologist.

PUBLISHED BI-MONTHLY by The Earth Science Publishing Company, Incorporated, Box 1357, Chicago 90, Illinois. *Business Manager,* J. Daniel Willems; *Business Associate,* William H. Bond. • SUBSCRIPTIONS: $2.00 per year, United States and its possessions, and Canada; elsewhere $2.50. Advertising rates on request. Address Box 1357, Chicago 90, Illinois. • EDITED BY Ben Hur Wilson, 406 Grover St., Joliet, Illinois; *Managing Editor,* Hiram L. Kennicott; *Associate Editor,* William A. Allaway; *Club Editor,* Bernice Wienrank; *Editorial Staff,* William A. Bingham, Frank L. Fleener, Russell P. MacFall, Kirtley F. Mather, James O. Montague, H. H. Nininger, Willard H. Parsons, Richard M. Pearl, Ken Russell, C. W. Wolfe, H. P. Zuidema. • EARTH SCIENCE is receptive to articles of earth science interest. Manuscripts, photographs, sketches will not be returned unless accompanied by ample first-class postage. Permission to quote or reprint articles from this magazine will be considered upon written request. Communications for editorial consideration should be sent to the *Editor in Chief,* Ben Hur Wilson, 406 Grover St., Joliet, Illinois. • CHARTER LIFE SUBSCRIBERS: John C. Bohmker, R. E. Caliga, H. D. Cohn, J. E. Farr, James O. Montague, Charles H. Preston, H. T. Perry, H. R. Straight, Chicago Rocks and Minerals Society, Earth Science Club of Northern Illinois, Marquette Geologists Association. (These subscriptions are available at $50.00.)

Photo by author. *Mrs. Julian Wetherbee,* of Keene, New Hampshire, is a thoroughgoing devotee of earth science, with an eye for interesting background. Photos by C. T. Bodwell. *Mrs. Mary S. Coates,* geologist, of Elgin, Illinois, recently with the Chicago Natural History Museum, now works with a consultant. *Dr. C. W. Wolfe,* of Boston, Massachusetts, is on the faculty of Boston University. *Harry E. Peterson,* of Downers Grove, Illinois, is active there in the Earth Science Club of Northern Illinois, his particular interests being as lapidary and silversmith.

*

Cover

The White Mountains abound in beauty spots and one here pictured is the Flume at Franconia Notch leading to the Basin and its view of the Profile—the Great Stone Face.

—BEN HUR WILSON, *Editor*

ROCKHOUNDS, CAN YOU LEND A HAND?

Strange to relate, at no other place in the Western Hemisphere, perhaps, can one visit such a stupendous work of the grotto builder's art, as in the small town of West Bend, in northwest Iowa, where is located the world-famed Grotto of the Redemption.

Here, resting in the heart of the midwest prairies, probably as far removed from any good mineral collecting area as any other place in the entire country, is to be found one of the greatest collections of minerals ever brought together in any one spot. Literally hundreds of tons of superb crystalline material, coming from almost every corner of the continent, have gone into its construction, a seeming incongruous anomaly if ever there was one.

The job of completing this beautiful edifice, begun more than forty years ago by the late Reverend P. M. Dobberstein*, Roman Catholic priest, who died last summer at the age of eighty-one, falls to his long time parishioner and understudy, Matthew Szerensce, who knows much more than anyone else about the millions of pieces of material, from all parts of the world, that have gone into this great effort.

All of the religious scenes and "stations" are amazingly well detailed in the loveliest of rock formation, mostly crystalline. The work, however, is not finished and there still remains a great deal to be done. Much help will be needed to complete it, and many more years of time will be required to round out the original plans.

Especially needed are large quantities of petrified wood, white quartz and flint rock, all costly items, to finish the many scenes of religious significance. Rockhounds everywhere, regardless of creed or faith, have in the past contributed freely of materials required. No doubt there are many others among our readers who would like to have a part in this notable undertaking, built for the admiration and instruction of man, and dedicated to the Glory of God.—B.H.W.

*See September-October, 1954, issue of EARTH SCIENCE, page 15.

CLASSIFICATION OF ROCKS. Department of Publications, Golden, Colorado. $1.00 postpaid.

Marking the beginning of its second half-century of service to the mineral industries, the *Colorado School of Mines Quarterly* has released a significant publication of vital interest to both professional goelogists and amateur rockhounds.

"Classification of Rocks," Volume 50, Number 1 of the *Quarterly,* is the work of Dr. Russell B. Travis, assistant professor of geology at Colorado Mines and a 1943 graduate of the college.

Knowing by experience of the confusion and misinformation resulting from the many and various methods of rock nomenclature, Dr. Travis has attempted to name rocks on the basis of visible features, using terms and conventions generally accepted at present.

As a consequence, the publication is of extreme importance to organizations engaged in exploration for petroleum, metals, non-metals, and radioactive mineral deposits whose development programs depend on standardization of rock names among many men and departments.

Included in the *Quarterly* are full instructions for naming any rocks—igneous, sedimentary, or metamorphic, and three complete reference charts, each nine by sixteen inches, for use in the field or classroom. Sixty-six photographs illustrate features described in the text.

Earth Science

July-August, 1955 Vol. 8, No. 4

Plant Life of the Past

by CHARLES AND MABEL BASS

TO PUT SEEDS in the ground is supposed to be the principal interest of farmers. Although we are farmers, yet for some time we have been interested in taking seeds out of the ground. The rare seeds which merit this unique attention are not ordinary seeds of wheat or turnips or apples that one can buy at the store or find listed in the seed catalogue. They are seeds that have turned to stone, petrified seeds, or what we prefer to call, correctly we believe, fossil seeds.

This interest in fossil flora had its beginning many years ago when Charlie, the geological member of the team, began collecting Indian arrowheads and artifacts. His interest then progressed through minerals and fossils, with Mabel, the unscientific member, remaining merely a mental tag-along.

One day Charlie said, "You're a plant lover, why don't you make a collection of petrified woods?"

Making personal application of the suggestion, he began to add to his few pieces of fossil wood. While this collection has grown satisfactorily, it is not yet as large as those of some of our friends. However, we do have many lovely little complete limb casts showing bark structure. These are polished on one end to show the beauty of the vari-colored agate of which they are composed. We have larger cross-sections of wood from three to six inches in diameter and three fourths of an inch thick. These show growth rings, cell structure or bark. These woods are not all identified, for as every collector knows, identified woods are not numerous. We have, among others, poplar, sagebrush, cycad, tempskya, palm, ginkgo and oak.

The logical way to expand a fossil wood collection seemed to be to add seeds and leaves. Slowly, with much diligence and labor, our fossil flora collection has grown to be what we are told is one of the largest and most varied to be found anywhere. The most outstanding part of the collection, however, are over forty kinds of fossil seeds, cones, nuts, and fruits. It is of these that we wish to tell you more in detail.

Our first seeds were those of the fossil walnut, Juglans siouxensis, from the Oligocene formation of western Nebraska, written up many years ago by the late Dr. Berry. This area yet remains our most prolific local source of fossil seeds, although one should never use the term "abundant" in connection with fossils of this type, as there is no such thing as an abundance of any fossil seed or nut. They are all scarce and some are more scarce than others. These walnuts are about three-quarters of an inch in diameter, of a golden-brown color and perfectly silicified. We find broken pieces, quarters, halves, and complete nut kernels, some showing shell. Along with the nuts is found an abundance of fragmentary silicified wood of about the same color as the walnut kernels. This shows no cell structure but some rather nice worm eaten pieces are found.

The ironized redwood cones, Sequoia dakotensis Brown, from the Cretaceous of North Dakota, are very small for cones of

such a large tree. They are nearly round, about an inch in diameter, of a dark brown color and quite perfectly formed.

Perhaps our favorite specimens are the agatized pine cones from the Oligocene of northwestern Wyoming. They are so natural looking it is almost unbelievable. They do not yet have a scientific name. Of course we have the fossil spruce cones from the Cerro Cuadrado petrified forest of Patagonia, South America. These are quite widely known. We have other conifer cones from Nebraska and Idaho.

From the well known Eocene beds of the Clarno district in Oregon we have walnuts, hickory nuts showing shell, grape seeds, and a little boat-shaped fossil seed cast named Odontocaryiodea nodulosa, an extinct member of the Menispermaceae or moonseed family. We have beech nuts from the Miocene of Vermont; figs, Ficus ceratops, from the Cretaceous of North Dakota, and a beautiful cycad bud from the Cretaceous of South Dakota.

The most common fossil seeds in the collection are those of the hackberry or Celtis. We have hackberry seeds from four geological horizons, namely, Pliocene, Miocene, Oligocene, and Eocene. The hackberry trees apparently withstood changing climatic conditions better than other trees, as their seeds are known to be preserved all the way through the Tertiary.

The fossil seeds most likely fated to became famous are those of the Iodes, which is a genus of living plants now growing in the tropical regions of southeast Asia and Africa. Dr. Richard Scott, working with Dr. C. A. Arnold, well known paleobotanist of the University of Michigan, tells us that Iodes is known as a fossil from the Eocene of England, but has never before been recorded from North America nor from beds younger than the Eocene. Consequently our finding it in the Oligocene is noteworthy. We have found only four of these seeds, one of which we have given to Dr. Scott to be used as a type specimen in his forthcoming published description.

Among the unidentified seeds in our collection are two three-quarter inch long agate catkins, perfectly preserved and perfectly beautiful; some tiny seeds so closely resembling peas that when placed beside an ordinary pea seed they are as "alike as peas in a pod". There are some seeds resembling chestnuts, some that look like cherry seeds, and some that a prominent authority says upon closer examination may prove to be cycad seeds. Besides these there are a number of others that still do not have scientific names.

The reader may be wondering why we seem so uncertain as to the names and identity of some of these specimens. The fact is that no matter how closely a stone object may resemble its present day counterpart, yet the collector may not call it by name until it has been identified by the "powers that be", that is, a qualified scientist or paleobotanist who has studied it, given it a name, recorded a type specimen, and published a written description.

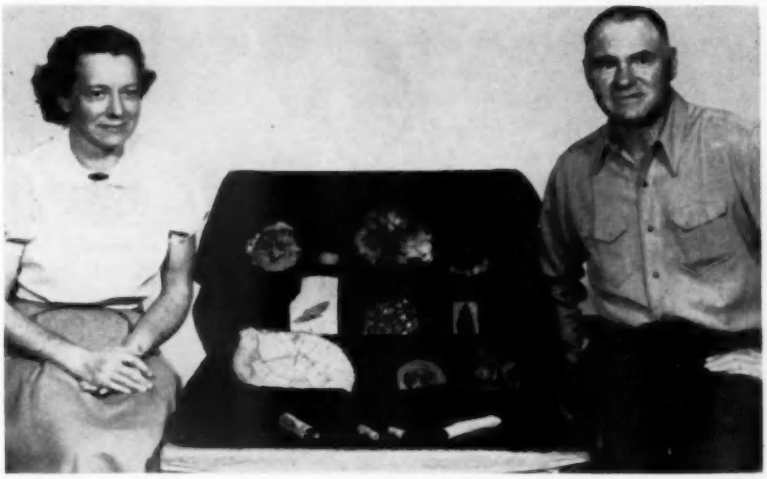
As for our fossil leaves, not much can be said, as they are not too numerous. Perhaps our next project will be to concentrate on enlarging this portion of the fossil flora collection in much the same manner as the other divisions have been built up. This will be accomplished by devoting many days to making long and exhausting field trips; spending hours in strenuous digging or on one's hands and knees searching for tiny items; by long conversations with other individual collectors to consummate a trade, and by much correspondence with, and visits to schools and museums for information and to make satisfactory exchanges.

No branch of our collection is yet complete. As a matter of fact, we never expect it to ever be completed, for as long as there are any more fossil seeds, or woods, or leaves to be found we intend to keep on looking for them. We would love to find an acorn or a different cone or fruit than has ever been found, and this we will do unless old age overtakes us too soon. We sometimes wonder if the study

of paleobotany has yet been given its rightful place in the study of the science of living things.

Extensive research has been carried on in the field of paleontology, but without the former there would be none of the latter. Without the plants, trees and grasses, the leaves, seeds and fruits, the animals of antiquity would not have been able to exist. We have never regretted choosing this hobby, or perhaps we should say that it chose us. For if you ever begin to pay attention to fossil flora you will find the interest growing on you like a coat of tan on a summer day. Once you have found the specimen that is one in a million or to repeat a well worn rockhound expression, that is "out of this world", once you have seen through a magnifying glass the intricate perfection of a tiny agate seed or the delicate cell structure of a piece of replaced wood, you will give your heart to this fascinating pastime. This hobby, and the other earth science hobbies as well, are like beauty, their "own excuse for being". They carry with them the diligence of study, and the dignity of labor, the thrill of discovery, the pride of possession, and the pleasure of sharing.

Trees of the ancients, plants of the past,
Fruit of the gods, leaves that will last,
Catkins of agate, flowers of stone,
Silica walnuts, agate pine cone,
Seeds of the Iodes, tropical vine,
Have lain in the mud through ages of time.
Seeds of the hackberry, others I've found,
Lie in my case on velvet background.
These are the essence of nature's spring-time,
God has preserved them, now they are mine.



MR. AND MRS. BASS (CHARLIE AND MABEL), with a few pieces of their fossil wood.

LOW-COST TOPOGRAPHIC MAPS

A total of more than 17,000 topographic maps are the result of systematic studies published by the Geological Survey since its establishment in 1879 "to classify the public lands and to examine their geologic structure, mineral resources and products."

About 1,600 new maps will be published this year representing some 88 million acres.

Copies of published quadrangle maps can be obtained, mostly at 20 cents each, by addressing the Geological Survey, Washing 25, D. C., or for areas west of the Mississippi, the USGS, Denver Federal Center, Denver, Colo. Index maps of individual States showing areas already mapped are available free upon request.

Atomic Energy from Bone Valley

by HENRY P. ZUIDEMA

A CHAIN-REACTION in the economic field, with far-reaching significance, may soon be set off in west central Florida.

Uranium in the heretofore worthless leached zone of the phosphate deposits of the Bone Valley formation makes it possible to process millions of tons of what is now dumped on spoil banks. That is the substance of data presented to the Atomic Energy Commission.

An engineering and economic study places the uranium content of both commercial and leached-zone phosphate deposits at 0.1 to 0.4 pounds of uranium oxide per ton. Of the 39 million tons of matrix mined in a single year, 1952, some 14 million tons from the leached zone was left on dumps. The total tonnage moved during the years thus contained substantially more than 4 million pounds of U_3O_8.

Four uranium recovery plants already are in operation in the commercial phosphate area and are operating at a profit comparable to that of plants in other uranium regions.

The double-kick in the plan, which is looked upon with favor by the A.E.C., is that establishment of a nitrophosphate fertilizer plant on the leached ore zone, would step up the production of needed phosphate and at the same time open up a new rich source of atomic energy.

A survey made at the request of the AEC and recently reported on in *Chemical Engineering* showed that such a plant could produce 200,000 tons of nitrophosphate fertilizer at a cost of about $54 a ton, and that a selling price of $81 per ton would allow an acceptable return on the investment.

Florida's Bone Valley formation, singularly interesting to the geologist, has been a factor in the state's economy since 1888 when pioneers with hand shovels first worked the deposits for fertilizer. Largest of the "land pebble" phosphate fields, the Bone Valley's known extent is about 1,400,000 acres, lying east and southeast of Tampa. It has long given Florida first place in American phosphate production.

Uranium now takes its place among other by-products of the operation such as construction sand and fluorine gas.

The beds are worked extensively west of Bartow where the formation is about 50 feet thick. It is covered everywhere by thin overburden of the Pleistocene, or Ice Age, deposits which mark positions of the sea shore during intervals of higher water level. Below these is the leached zone from two to 25 feet thick which contains 10 to 12 per cent phosphorus pentoxide. The pebble concentrate below the leached zone is the "pay ore," containing 30 to 35 per cent P_2O_5.

The "bones" of the Bone Valley formation include those of extinct species of various land animals and these suggest that the age of the formation is lower Pliocene. The basal part of the formation is a conglomerate containing pebbles of phosphate derived from the underlying bedrock which is the phosphatic limestone of the Hawthorn formation. The sand and clay in which the pebbles are embedded is separated from them by flotation after the sludge from hydraulic mining operations has been piped from the beds to the concentrating plants.

Study of the Bone Valley by Dr. George Gaylord Simpson of the American Museum of Natural History causes him to believe that the Bone Valley probably was laid down in an estuary. "The sediments," he says, "themselves bespeak periods of quiescence and periods of fairly rapid shifting currents in shallow water, as in a sluggish river, estuary or lagoon. Land mammals and terrestrial tortoises are abundant and in several instances have been found so associated that they cannot have been removed far from the place of death."

Crocodiles and sea cows in the formation support this view, as these animals are at home in an estuarine environment.

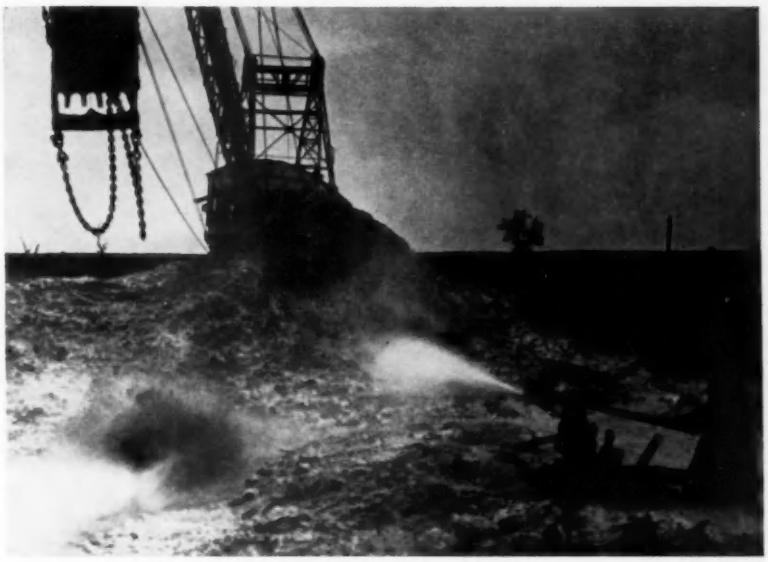
Land mammals from the Bone Valley include three-toed horses, a short-legged rhinoceros, a camel, and an ancestor of the true mastodon. The Bone Valley is no paradise for the vertebrate paleontologist, the fossils often being scattered and destroyed during the hydraulic mining operations. Bones of Ice Age land mammals, such as the giant ground sloth, have been found, evidently washed in from the overlying deposits during mining.

The economic importance of the Bone Valley deposits may be judged from the reports of soil scientists. Without phosphorus there could be no life as we know it, for every cell of plant and animal contains it. Without phosphorus and potassium, nitrogen cannot be effective in bringing high crop yields.

"Between 1904 and 1933 the phosphorus content of a test field in Illinois on which corn had been grown every year without treatment was reduced from 900 to 650 pounds per acre," says one authority. "The phosphorus balance in the soils of most states is in the red."

In the raising of livestock, no dietary deficiency is so common as the deficiency of phosphorus. A phosphorus supplement in a test herd of cattle in Pennsylvania increased milk production 35 per cent in four weeks.

With or without its fortune in uranium, Florida's Bone Valley would seem to have little cause for worry for at least another century or two.



A DRAGLINE DREDGE transports uranium-bearing ore to site where HIGH-PRESSURE MONITORS wash it down into sludge. The sludge is carried by pipeline to the phosphate concentrating plant. (Virginia-Carolina Corporation operation near Bartow, Florida.)

URANIUM YEARBOOK. New Science Institute Press, Los Angeles, California. $2.00 postpaid.

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Copies may be obtained by mail if not available at local book stores or newsstands.

Through Franconia Notch to the Great Stone Face

by MRS. JULIAN WETHERBEE

AS WE ENTER Franconia Notch from the south, we come upon a stupendous gorge known as the Flume.

The Flume is a deep chasm or gorge having precipices of granite on each side, while a mountain torrent falls over crags and loose masses of rock. In dry weather in places a person can cross the stream by stepping from rock to rock.

This is not a water worn chasm. The walls have projecting ledges on each side which are well defined.

Until a few years ago one of the most remarkable objects seen in the Flume was an immense rounded block of granite which hung over-head, supported by small surfaces in contact with the sides of the chasm. This rock has disappeared, probably torn down by floods or the sides breaking away that held it for so many years.

Even on a hot summer day, as you walk up the Flume the air is cool.

The State has erected walks through the Flume, over the rocky torrents of pure clear water. In places the gorge widens out and allows more space for walking beside the stream.

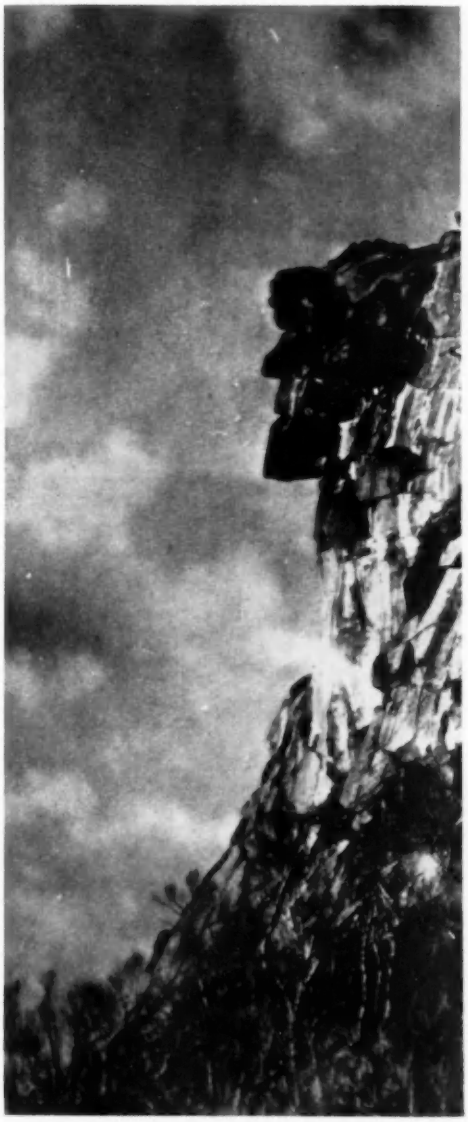
A little further north in Franconia Notch we come to the Basin and the Profile. These are the scenes admired by travelers who visit this place.

The Basin is a deep excavation in granite, which has been formed by the continual action of the falling waters of the Pemmasawasset, aided by the whirling and grinding action of rocks that are swept into the cavity by the stream.

As we follow the road, we pause where in early days man first looked up and saw this great handicraft of nature. From the edge of Profile Lake the Old Man of the Mountains towers over 1,000 feet above the lake and the road.

On a rocky shoulder of Cannon Mountain, looking calmly down upon all, the grim face of stone that has watched over this little lake for untold years is still keeping vigil as the centuries sweep past.

(The Profile of the Old Man of the Mountains, the Great Stone Face, will go around the world this year. For the Postmaster General has approved a postage stamp to commemorate the sesquicentennial of its discovery in 1805 by a party of pioneer New Hampshire road builders.)



Many legends and traditions surround this stern-featured Sentinel. The Indians believed the expression on the Stone Face changed with the years, that before the white man it seemed happy, but later assumed the appearance of grief.

Drake said: "This gigantic silhouette, which has been dubbed the Old Man of the Mountains, is unquestionably the greatest curiosity of this or any other mountain region. It is unique. The face puts the whole world behind it. It does everything but speak."

All of this and more that cannot be described in words, done by a few pieces of shattered rock and the imagination of man.

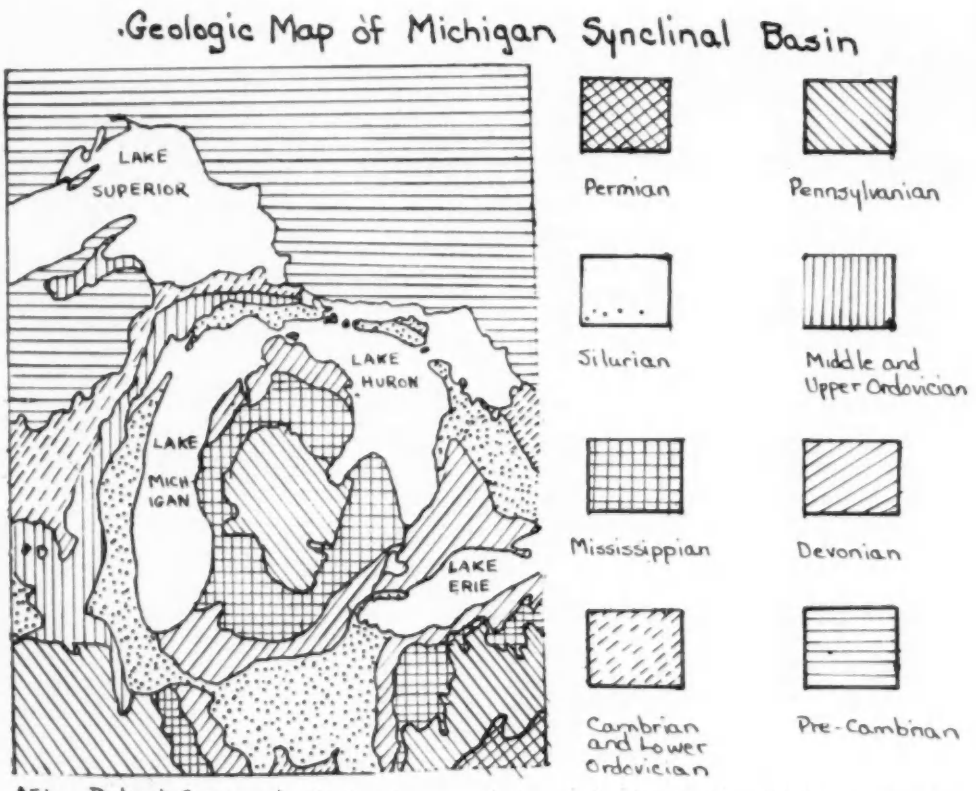
("Geologists state that the Old Man was created by an almost unbelievable whim of capricious Dame Nature a couple of hundred millions of years—give or take a year—ago. What happened was that when the great ice sheet was departing this continent, the Conway granite, of which the profile is formed, was broken into a complicated series of fractures and five layers of ledge. As if by design, they left a most remarkable left-side-of-the-face profile of a man measuring about 44 feet from the top of its head to the foot of its firm, determined chin. This likeness is perched at approximately the 3100-foot elevation on the upper cliffs that form the west wall of Franconia Notch, almost 1200 feet above its reflection in Profile Lake."—New Hampshire Planning and Development Commission.)

Geologic History of the Michigan Basin

by MARY S. COATES

IN PALEOZOIC TIMES the whole basin was surrounded by high uplands. To the west was the Wisconsin Arch, a broad fold rising 8,500 feet, running southeastward into Illinois from central Wisconsin and following the line of the highly metamorphosed pre-Cambrian mountains which were baseleveled before Paleozoic time. To the south and east the basin was bordered by the Cincinnati anticline which divided, one branch going northeast into Ontario and the other, the Kankakee Arch, running northwest to the southern end of the present Lake Michigan where it joined the Wisconsin Arch. The eastern branch, only 5,000 feet high formed the shallowest rim of the basin in southeastern Michigan where a low saddle of 3,800 feet connected the Michigan Basin with the Appalachian geosycline. To the north the basin was probably continuous with the Lake Superior geosyncline which ran around the upper peninsula to the northern tip of the lower. North of this, to the northern end of Lake Huron and almost to the east coast the rocks rise to intensely folded and faulted pre-Cambrian rocks. Thus the basin was comparatively quiet geologically while diastrophism occurred around its edge. It was these movements which isolated the area and formed the basin which sank progressively with the deposition of new sediments.

Detroit lies at the southeastern corner of this structural basin on the slopes of the lowest of the surrounding anticlinal arches. The bedrock shows the expected synclinal structure with the different beds dipping to the northwest and striking north-south. The earliest record we have in this region is the deposition of the Cambrian and Ordovician of the surrounding uplands, but these have not been penetrated to any great depth and their characteristics and origins have not yet been thoroughly studied. But it is necessary to note that during Middle Ordovician time diastrophism, which was to affect later deposition, was occurring to the east and the south while the basin itself was covered with a shallow marine sea. At this time the Finlay Arch, part of the Cincinnati anticline, and the Algonquin Axis, which extends eastward from central Ontario, were elevated and from these, Cambrian and Lower



After Robert Newcombe "Structure and Accumulation in the Michigan Basin and its Relation to the Cincinnati Arch." Problems of Petroleum Geology. 1934 Sidney Powers Memorial Volume. p. 534.

Ordovician rocks were stripped and deposited in the basin. At this time also the main deformation of the Cincinnati anticline was just beginning.

The deposition of rocks containing marine shells of Silurian age indicates that these beds represent the bottom of the old Silurian sea which covered all of Southern Michigan, much of the Mississippi Valley and a great area to the north. At this time the central part of the country was integrally connected with the Appalachian geosyncline as shown by the extensive deposits of magnesium limestones over the area. But during this period and successive ones, intermittently the basin was completely isolated and a warm, dry climate led to evaporation and precipitation of the Salina formation from the resulting supersaturated solution. This formation contains dolomite, anhydrite, gypsum and salt beds and in some places reaches a maximum thickness of over 1,200 feet. Overlying this, the Monroe formation or Bass Island Series of Southern Michigan, consisting mainly of dolomites resulting from organic accumulation and chemical precipitation of calcium and magnesium carbonate, is a late Silurian deposit which is interrupted by the deposition of the clastic Sylvania sandstone derived from the nearby shores. At the end of the Silurian era the sea bottom was gradually uplifted and temporary land conditions prevailed over much of the area. The subsidence and return to marine conditions marked the beginning of the Devonian period.

The Devonian sea resembled an archipelago in shape and many areas in adjacent states which were under water in Silurian

times were now islands or peninsulas. The Dundee limestone, the first Devonian deposit in Michigan, illustrates the development of life, for the Silurian molluscan forms were now exchanged almost entirely for new types of marine shells and the first indication of fish forms. The early deposits of this limestone seem to be entirely free from river deposits but the Middle Devonian shows either a more humid climate or an uplift of surrounding lands, or both, resulting in more vigorous erosion and the deposition of muds forming the Traverse formation. During the Upper Devonian conditions again changed and large parts of the old Devonian coastline of Northern Indiana and Illinois were now submerged. The eroding power was reduced by the lowered gradient and large swamps along the shores contributed fine sediments of vegetable matter. The deposition of these fine sediments, now the black Antrim shale, which is distributed over Ohio, Indiana and into the southern states, marks the end of the Devonian in Michigan.

There is no definite break in sedimentation between the Devonian and Mississippian periods but the sediments gradually became coarser, forming the Berea sandstone. Upon this, the argillaceous sediments of the Coldwater formation were deposited, probably on a subsiding sea bottom. These shales were changed to the sands of the Marshall formation by a slight elevation of the surrounding lands and a consequent rejuvenation of the streams. The Marshall sandstone forms the youngest Paleozoic formation in the Detroit area but it is probably true that here, in the Pennsylvanian and Permian, as in other parts of the basin, sedimentation continued and the Mississippian sea shrank with the encroaching marshes along the shores and with the increasing aridity. The result was the formation of broad shallow basins connected only by wide flat marshes of Lepidodendron and Calamites. These marshes now form the low quality bituminous coal beds of the Michigan Coal Measures.

At the end of Paleozoic times all of Michigan rose several hundred or several thousand feet and at the same time all of Ohio and Indiana was raised above sea level. During the Mesozoic era the whole region was eroded and nearly peneplained, only in Cenozoic times to be again uplifted and eroded. The more resistant rocks remained as dissected uplands while the softer rocks were subjected to heavy erosion. In the late middle Tertiary period another uplift caused the downcutting of both the uplands and the lowlands.

The Pleistocene era brought the great continental glacier to Michigan and the southern states. The glacial deposits of southeastern Michigan are extensive, ranging up to 400 feet in depth, but of these it is difficult to separate the Kansan, if any, and the Illinoian from the Wisconsin materials. In fact, very little is known of the pre-Wisconsin or of the earliest Wisconsin glaciations in Michigan. Possibly the Keewatin ice sheet which accumulated in central Canada, west of Hudson Bay, and which spread southward into northeastern Kansas and central Missouri, could have spread southeastward into Michigan, Indiana and Ohio. If this occurred it must have melted before the huge Labrador ice mass moved southwest, covering southeastern Iowa, southern Illinois and northern Kentucky. There is much speculation whether the hard compact till which seems to form the great bulk of the glacial till of the area is of Illinoian glaciation and whether the thin overlying till is of the Wisconsin stage. But is it certain that there were two distinct phases to the last glaciation which covered Michigan, separated by a warm, humid interglacial period. This is indicated by the drainage pattern of the streams and the large accumulations of loess in some sections.

The area of these northern states was covered by three great lobes of ice, the Lake Michigan lobe whice spread southwest and west from Lake Michigan, the Saginaw lobe which moved southwestward between the thumb and forefinger of the Michigan

"mitten", and the Huron-Erie lobe which moved south and southwest across those two lakes. This meant that for a long time the whole of the southern peninsula was under the ice sheet.

After the glacier reached far into southern Ohio it began to retreat and spasmodically melted and remained stationary. The retreat and melting of the ice caused the present topography of the Detroit area, which is divided into two distinct land forms, the rough hilly moraines and the flat relatively uninteresting glacial lake bottom. These terminal and lateral moraines, made up for the most part of material incorporated in the glacier and to a small extent of debris pushed ahead of the glacier during its advance, were deposited during the periodic pauses in the melting of the ice. The most prominent of these moraines, the Defiance Moraine, twenty-five miles northwest of Detroit is three to four miles wide and very rolling and irregular with numerous kames. The beach of the glacial Lake Maumee follows the edge of this moraine and the erosion of these morainic features is responsible for most of the irregularities of the old lake bottom.

On the Detroit plain, to the southwest of the Defiance Moraine, eleven of these wave-cut beach terraces running northeast-southwest are discernable. On the whole these are low but the most conspicuous ridge, the beach of Lake Whittlesey, stands seven to fifteen feet above the level of the lake plain. These were formed by the wave action of the glacial meltwater, which at first flowed into the Mississippi River but which later accumulated in small lakes which gradually merged to form the large Lake Maumee, covering the present Lake Erie Basin and the lower parts of the surrounding land. This lake, whose name was changed several times to indicate its different sizes and shapes, gradually shrank until today we know it as Lake Erie.

*

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ONTARIO—QUEBEC: A MINERAL COLLECTOR'S PARADISE

by DR. C. W. WOLFE

(In the last issue Dr. Wolfe told of excursions from Terrace Inn at Wilberforce, Ontario, and of securing an apatite crystal weighing over 100 pounds.)

II.

When we returned to the Terrace Inn, we were so sick of looking at beautiful apatites we were convinced that the collecting of apatite crystals would never interest us again. The next day we were guided by an uranium prospector of considerable talent. He was very kind to us, leading us to spots we might never have seen otherwise. The first stop of the day was along the banking of the road 300 yards from the Inn, where some large boulders of marble yielded handsome sphene crystals varying in size from 1/16 inch to ½ inch. They were resplendent and complete with that typical flat and bladed form which gives rise to the name of the mineral. We carried off hundreds of the crystals in the marble matrix as we went on to the Rare Earths Mine. This mine was in the sampling stage, with ditches and dynamited pits. The most important mineral of the locality was zircon, which carried various rare earth elements. One particular block of rock had been set aside for us. This two foot cube of feldspar was highly oxidized because of the decomposition of the radioactive elements in the zircon. It was so decomposed that it would shatter with a very slight blow of the hammer. One 6"x6"x4" specimen which left the mine with me contains hundreds of zircon crystals from hand lens to quarter inch size, many of them with well formed planar faces. Many of the crystals are not only terminated tetragonal prisms, but are doubly terminated.

We thought we had seen about enough for the day, but we went on to Old Smoky and arrived there just at lunch time. It is an inconceivable place, with many prospect pits on the flat hillside. As we walked up to the largest pit we saw a mass of pink calcite beautifully pink, four feet across. Disseminated through the pink calcite were gemmy green apatite crystals. I immediately said, "This is my claim" and then sat down to eat. Before long I was hard at work on the calcite but had the feeling that folks were sliding away from me along the hillside. Well, I decided to do the same and came upon the group working feverishly and madly at extracting handsome apatite crystals which were doubly terminated, six inch long prisms, terminated by the basal plane. The marble which surrounded the crystals was only slightly obdurate, but the cleavage in

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(from page 16)

the marble frequently extended right into the apatite crystals, thus spoiling them when attempts were made to remove the marble. But many good ones, perfect crystals, joined us. Soon I was aware that several of the folks had disappeared again; so I took up their trail to a 5′ x 4′ x 50′ ditch 300 feet off in the woods. Lining the ditch, which was primarily the result of chemical weathering along a zone in the marble, there were handsome biotite crystals 4″ x 4″ x 3″ in clustered groups. A very striking group of diopside crystals, the average length of which is five inches, severed from the wall without mishap. Apparently, prospectors had found the ditch with a thick covering of dirt in the bottom and had shovelled out the dirt. While I was working industriously, trying to get recalcitrant crystals of apatite out of the wall rock, I suddenly discovered that the folks were picking them out of the dirt which had been shoveled out of the ditch. By the time I got to the dirt, I discovered they had taken all of the good ones, but there were unlimited supplies of terminated crystals remaining. We carried bagfuls away. By the time we left we were ashamed to look an apatite crystal in the face.

That was all for Wilberforce, and we started off the next morning for Bancroft, Ontario, over a road which was B-r-r-r-r. The beautiful big apatite crystal was wrapped and placed in the trailer, and every one of the millions of bumps we hit made me groan inside, for I could just feel that apatite hitting the floor of the trailer. Amazingly enough, the crystal not only weathered that part of the trip but the remainder of the trip as well. In Bancroft we stayed at the hotel, but we cooked all our own meals and found it more satisfactory and less expensive to do so.

Our first mineral collecting attempt ended in failure, for I could not find the cancrinite locality which I had visited earlier. Then we went on to the big sodalite deposit of the Golding-Keene working. That sodalite deposit was really fascinating. Here you have an exposure on one wall of the quarry of nothing but sodalite over an area of five feet by four feet, and disseminated through the sodalite is a large concentration of pyrite. Before weathering had set in, the beautiful blue of the sodalite crossed and penetrated by silvery yellow pyrite must have been a very choice sight. Well, there was all the sodalite we could carry away, but our problem was fast becoming: how much must we leave behind? But leave we did and went on to the Golding-Keene nepheline syenite deposit, where pegmatitic concentrations of nepheline and plagioclase feldspar had been quarried for use in ceramics. This was to be the campsite for five of our folks for three nights. A few crystals of nepheline were found near the quarry, but just down stream along the York River, which flowed by the quarry, was a most beautiful falls which outdid the minerals in charm: no billboards, no hot dog stands, no beer cans. I sent the folks down to see a corundum deposit just above the falls while I prepared supper, but the falls beckoned them on; so it was not until the next morning that any serious attempt to remove corundum crystals from the massive nepheline syenite deposit took place.

During that night rain began to fall about 4:00 a.m., and the folks who had slept out were feeling rather dismal when we reached them in the morning. I said to one of them who was starting to do the dishes that I would give her the first good corundum crystal that I found, which brightened her a little. Collecting the corundum was a little more difficult. The rock was obdurate, requiring repeated blows with the sledge hammer. The first blow of the sledge, however, revealed a terminated prism of sapphire, not very large—about a half inch long and less than a quarter of an inch across, but that was promised to Katherine. As events developed, that crystal turned out to be the best which I found, but she got it. The rock was peppered with corundum, perhaps as much as 15 per cent by volume. Much of the mineral was a delicate blue, but none was transparent.

Just across the river from our campsite there was a locality for beautiful green diopside crystals and cinnamon chondrodite garnet. We did not get good specimens there, because we did not have time; but I know that unusually good specimens have been taken from the locality.

As we were returning to the campsite, whom should we meet but the curator of the Geological Section of the Royal Ontario Museum, Dr. V. B. Meen. I had sought to contact him by phone as I passed through Toronto to no avail. Thus I was particularly happy to see him in Bancroft and to have an opportunity to chat with him. His knowledge of mineral localities in Ontario is one of the best.

The next day we visited the MacDonald mine. There is nothing unusually interesting about the mine, with the exception of two-foot cleavages of calcite—some pink, some white. Pegmatites in the States, insofar as my experience extends, never show such concentrations of this mineral. Many uranium spots with their uranium burns and alteration products were to be seen in the roof of the quarry out of reach.

The next day we were to meet two of our party who had gone on ahead to pick up the wife of one of them. The rendezvous was to be Quadeville, another spot of unbelievable character. We met at 11 o'clock and set off for the locality. We found a quarry which I thought I recognized as the one which I had visited the previous November. True, there was no amazonite nor beryl on the dump, but I decided that the Canadian geologists must have salted the dump with unusually good specimens before our field trip crew from the annual meeting of the Geological Society of America had visited the place; so we should have to work for our beryl and other minerals. My suspicions, however, were not well founded, for I discovered later from Dr. Meen that we had gone to the wrong quarry. Now I find myself wanting to go back to Quadeville to try again. In spite of the fact we were in the wrong quarry, we found the visit very rewarding. We did get some excellent beryl. The quality is very strange, with a blue green color and a weathered look unlike any I have ever seen. The most unusual beryl was a sceptor crystal which was composed of a small prism about three inches long and five eights of an inch thick, on one end of which was a chunky terminated beryl, about twice the diameter of the prism. The unique feature of the pegmatite, however, was the extent of rose quartz in the pegmatite. We discovered that the entire hill top was one pegmatite, and it was almost entirely "bull" quartz. By actual measurement there was an exposure of quartz 600 feet by 200 feet on top of the hill, and over 10 per cent of the quartz was the beautiful rose colored variety. In addition to the rose quartz and beryls there were unusual bladed masses of magnetite disseminated through the feldspar along with a few concentrations of the unusual radioactive mineral euxenite.

From Quadeville we set off for Renfrew, and the roads were dismal, corrugated in such a manner as to make a wash board envious. The constant pounding on the wheels of the Oldsmobile was more than one of them could take, and we had visions of another bearing disintegrating, but after a thorough search the broken rim was spotted, and a spare was installed. That night we stayed in Renfrew in a hotel where, I am sure, the frequent trains up the Ottawa River Valley go right through the hotel. All night long I heard trains tearing through (actually the railroad crossing was adjacent to the hotel) and whistling belligerently as they crossed the Main Street of Renfrew. It was no wonder, therefore, that on the next day I felt sick, not awful sick, just misery sick. A few car repairs were needed by that time; so we did not leave Renfrew until noon, by which time I felt a bit green.

Our destination was Calabogie, with its big magnetite iron mine. One of the men in our party stopped in the town to get directions to the mine, and we followed meekly and weakly behind as he led the way. Well, we never did find the mine, but we did find a 60 pound mass of magnetite which took care of our collecting needs very well. The remainder of the day was spent in reaching Ottawa, where we arrived in the pouring rain on the outskirts of Hurricane Carol. Our plan was to spend the next day sightseeing and visiting the museums of Ottawa, and our plan was wise, for it rained all of that day and into the next night.

Sightseeing in Ottawa is a great pleasure, particularly the guided tour through the beautiful government buildings. Our visit to the National Museum was most educational, for their mineralogical and geological exhibits are set up for the purpose of enlightening the public. While the folks were looking at the exhibits, I dropped in to see Dr. Robinson of the Canadian Geological Survey, and he very graciously showed me around their research plant. He also introduced me to one of the members of their Survey who could tell me something about mineral collecting localities around Ottawa. This advisor asked, "How far do you want to go for the mineral localities?" I told him we were thinking of 20-30 miles. He said, "It is too bad you don't have any more time. Let me show you something which I picked up," and he brought out a three-inch feldspar crystal and a mass of molybdenite which was almost four inches across. My eyes lighted up a bit as I asked him where he got them. The reply was "Maniwaki." How far was Maniwaki—"100 miles due North into Quebec." I said, "How do we get there?" The next morning we set off for this Indian Reservation town.

The last forty miles to Maniwaki were travelled on a gravel road with great pools of water from the rains of the preceding 36 hours. On the return trip the water had dried away, but our cars were covered with road dust, some of which remains on the Oldsmobile to this day. As we approached the abandoned workings beyond Maniwaki, we dodged around the house near the opening to the quarry, for we were warned in Ottawa that although the owner was in Detroit, the Frenchman in the house didn't like strangers. The quarry could be seen on the low hill beyond the house; so we climbed through the fence and approached the dump. Every other block of rock on the dump had a piece of molybdenite on it at least two inches across. The whole face of the dump was lined with such masses. This was incredible. I have used this word many times in this description of our trip through Ontario, and it is not my custom, but incredible is the proper word. We felt just like pigs. What can you do with a plethora like that. We stuffed our knapsacks. The trailer, fully loaded, was waiting in Ottawa; there was no more room, but we just couldn't leave such specimens behind. The quarry, itself, beckoned us. There on the face of the quarry was an exposure of perfectly formed feldspar crystals. The exposure was eight feet by six feet, the crystals varying in size from a half inch to three inches across. The big chisels were inserted into frost wedged cracks, and soon large blocks of

the crystals were worked loose and carried to the subsiding trunk of the car.

I thought we had better get out of there before the Frenchman came up and ordered us off the property with no specimens; so at 12:45 we started back for Wakefield, Quebec, which was 30 miles north of Ottawa along the road we had travelled earlier. The point of interest in Wakefield was the large magnesium mine, a part of the activity of the Aluminum Corporation of Canada. The previous night I had called Montreal to get permission to visit the plant, but since we did not get there until 4:00 p.m. we had only enough time to visit the quarry and collect a few specimens. The source of the magnesium is the mineral brucite which occurs as disseminated grains, usually grey to black, in calcite marble. Associated with the marble were beautiful masses of pink and peach colored calcite and handsome green apatite. Serpentine in many colors was also present. As we were leaving the mine, the mine superintendent who had kindly guided us around the quarry took me down to the plant and gave me three slabs of foliated brucite with average dimensions of 8" x 6" x 1". Strangely enough these large masses of brucite were not usable in the plant, because it was organized to handle the disseminated brucite grains.

The next day we were en route home (again, of course, with more collecting en route, which again is another story).

Casting Fossil Models

by Harry E. Peterson

A TRILOBITE is a fossil crustacean of the Palaeozoic period, is probably one of the most widely known fossils on our continent, and everybody who gets exposed to trilobites just MUST start a collection.

We go down in the quarries and with crowbar, pick and hammer, pound and break the rock formations until we find and liberate the last earthly remains of these little creatures which inhabited the water of the Silurian sea about 360,000,000 years ago. Their forms are beautiful, symmetrical and curvaceous, like a next year's sports roadster or this year's Monroe, but you will rarely find them on the front of a calendar.

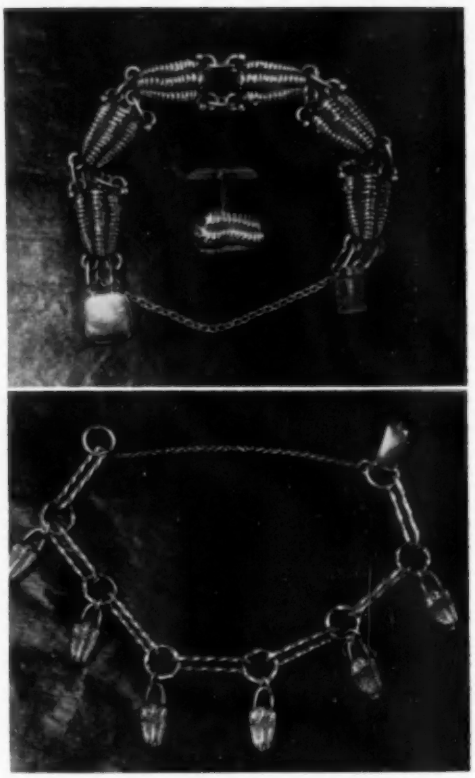
After we get them home, we ponder what to do with them. Of course, the mantle piece or the shadow box always lend themselves as appropriate places to show them off.

Your friends—the uninitiated ones—will pick them up and exclaim, "what kind of a funny looking bug is that!!"

But did you ever think of WEARING one? No? Well let me tell you that a trilobite can make a very beautiful and interesting piece of jewelry for any members of the family, specially if they are rockhounds. This being the great "do it yourself" era there must be a way for our amateur jewelry makers to find an outlet for their ambition to create something unusual, so let's see what we can do.

Now then, how do we go about making some piece of jewelry with a trilobite as the main attraction? Well, first we must find, beg, borrow or steal (perish the thought) a trilobite of suitable size and as perfect as possible.

It can be set in silver, in the same manner that you set a cabochon. In preparing it for setting, grind or file the underside flat, then file a ridge all around the lower part to give us



Trilobite Jewelry

something to fold the bezel into; make a bezel to fit and solder it to a suitably shaped piece of silver, apply a pin or a bail for chain, and presto, you have something that will make you the envy of all your rockhound friends.

Of course if you are handy with a moulding outfit you can cast your trilobite in sterling silver, but as solid castings are very heavy and therefore impractical unless very small, we hollow out the inside of our model as much as possible in order to reduce weight.

How do we make our model? You can use your pet Trilobite for a model without hurting it a bit, so this is a case when you can eat your cake and have it too. We are of course presum-

ing that your pet trilobite is free from the matrix and filed nice and smooth underneath like any respectable trilobite should be, and not just sticking his nose out of a 50 pound rock.

Do not attempt to hollow out your fossil, rather make an insert or core in your mould for your first rough model. I am now speaking of the method of casting with which I am most familiar, namely, with a sand mould that comes apart in halves, there are umphty other methods.

You will be surprised to see that even if your fossil specimen seems to be very sharp and clean, the casting will come out rather rough and will require a bit of fine filing and polishing before it can be used for a model.

Let's take a look at the articles that can be made with a silver Trilobite. A tie clasp can be made with a strip of silver about 17 or 18 ga., 5/16 in. wide and 5 in. long. Hammer it with a smooth ball peen hammer until it get's springy. Silver is too soft when you buy it and work-hardening by hammering or rolling is the only way you can make it suitable for any article that requires springiness.

Bend it over about half way and fasten your silver trilobite with lead solder. Do not use silver solder for this purpose as the excessive heat would again soften the silver.

Cuff links are easy to make. All you will have to do is to solder the connector to the back of the silver trilobite, again using lead solder this time in order not to lose the "snap" in the cuff link connector.

Earrings are made in the same manner, or solder a ring in either end of the casting and use as a drop earring or pendant.

In a similar manner attach one or two rings to each end of your castings and make attractive link bracelets.

The accompanying pictures of some of my work will perhaps give you a general idea of what can be done. Hope that you will have a lot of fun trying!

BIRTH AND DEVELOPMENT OF GEOLOGICAL SCIENCE—Frank Dawson Adams. Dover Publication, New York. $1.95 paper back, $3.95 cloth bound.

A review of geologic literature over the past two thousand years reveals that even so accurate a writer as Argicola, for example, reported that a magnet loses its powers of attraction if a diamond is brought in contact with it, and he repeated Aristotle's fable of the "pyrigonoi" or flies that live in the fires of the Cyprus copper furnaces.

As recently as 1705 the scientific writer Johann Becher theorized that metals originated on a "metallic tree" at the center of the earth. And in 1665 Professor M. J. C. Schweigger announced to a lecture group at the University of Wittenberg:

"It is clear that stones are generated as plants are—gold gives birth to gold, gems to gems, stones to stones. By virtue of their seminary power, each species reproduces and multiplies itself and preserves its own species intact and perfect."

Midwest Club News

BERNICE WIENRANK, *Club Editor*
4717 North Winthrop Avenue
Chicago 40, Illinois

HERBERT AND ORIOL GRAND-GIRARD, celebrated members of the Chicago Rocks and Minerals Society, left their Evanston domain a year ago to settle down in good old Santa Fe, New Mexico, one of the world's most enchanting vacation lands.

While both were government employees in the Chicago area, their avid hobby of collecting minerals brought them into close contact with other fields of interest in the earth sciences. Nine years ago they helped form a nucleus, the outgrowth of which became the Chicago Rocks and Minerals Society.

One day at a gathering of Chicago Rocks and Minerals Society members this still young couple surprised everyone by simply stating, "they were moving to the Southwest permanently." As in "ye olden days" it is also true today that to migrate southwest takes much fortitude, especially when one is dependent upon some form of livelihood. The Grand-Girards not only had the background and determination but in addition that good faculty of knowing what they willed of life, and merely went about accomplishing their goal.

Some folks are timid, and intelligently so, about testing their aquatic skill, indulging only in pondering the wet surface or dipping in at intervals to confirm their timidity and satisfaction. Others just set out and navigate; there are no apparent problems. This it is with the Grand-Girards.

They were especially concerned with community effort, particularly with furthering the best interests of the Chicago Rocks and Minerals Society through the society's publication the *Pick and Dop Stick* of which they were editors for a period of seven years. Herbert served the society as its president for the allotted period of two years, and Oriol inherited the task of historian. They won much recognition when they became active in the executive staff of the Midwest Federation of Mineralogical and Geological Societies, and both acquired the top ranking

offices in the Federation, Oriol as secretary, and Herbert as president.

Their removal from our midst is a distinct loss, but we are happy that our loss was the Southwest's gain. Did the Grand-Girards stake a new claim? Yes! They are the new editors of the Santa Fe Gem and Mineral Club's publication known as the *Stone Age*, and "Dinie" (the Dinosaur) is their mascot.

In memory of the past, those friendly open house affairs, the free lapidary and jewelry making lessons, those thoughtful good deeds on endless end, a full salute and a verse in chorus thus sung—"Good luck and good sailing to the Grand-Girards on their new ship, and may they live well and long!"

—HELEN L. COOKE

JOLIET MINERALORIST SOCIETY held a supper meeting on May 26 in honor of the 25th anniversary of the founding of the organization. The program featured reminiscences of charter members and several reels of movies of various club activities. The society has achieved distinction in many ways, both locally and abroad. Among other things, it was the first mineral club founded in the middle west and was one of the three founders of the Midwest Federation. Its members have carried on research and publication in many fields; they have recovered and preserved the second meteorite to fall in Illinois (and the only one ever to hit a vehicle of any kind), and have recently presented, through the courtesy of Frank L. Fleener, an outstanding series of lectures on the Mineral Kingdom.

*

MICHIGAN MINERALOGICAL SOCIETY held its annual picnic on June 5. This was welcome relaxation for the group, which had been working very hard making preparations for the Midwest Federation Convention, to which it would be host June 23-25 at the Hotel Tuller, Park and Adams, Detroit Michigan.

(See the next issue of EARTH SCIENCE for reports on the Midwest Convention.)

*

EVANSVILLE LAPIDARY SOCIETY has purchased enough opal from Australia to provide each member with a piece to be worked on at a special opal-cutting, planned for June 25. The opals will be placed in envelopes and passed out grab-bag-style to prevent sorting and choosing. Each lucky member will then be expected to cut and polish his opal on the spot.

*

CENTRAL IOWA MINERAL SOCIETY recently presented to each, the Iowa State College, the University of Iowa and the Iowa State Historical Society, a slice of polished petrified wood from a giant fossil tree found near Knoxville, Iowa, during strip-mining operations.

MINNESOTA MINERAL CLUB'S annual exhibit on April 17 was attended by 12,000 people. A total of 63 persons exhibited, nine of them juniors. One of the highlights of the show was an outstanding display of jade and other Alaskan gem materials by guest exhibitor Grace Bahovec of Baranof, Alaska.

The official publication of MMC, *Rock Rustler's News*, is now edited by four women, who threaten to fill up empty space with household hints if the men in the club fail to contribute articles.

*

CHICAGO LAPIDARY CLUB recently heard Harold Grossman, certified gemologist, speak on "Gem Identification." Mr. Grossman also demonstrated the use of gem identification aids, including a refractometer, microscope, polariscope and heavy liquids.

*

MICHIGAN GEM AND MINERAL SOCIETY was entertained with an "open house" on May 15 at the home of Mr. and Mrs. Earl Martin of Ann Arbor, Mich. The Martins have one of the largest gem and mineral collections in the Midwest and their opal and jade collection is the finest in Michigan.

*

EARTH SCIENCE CLUB OF NORTHERN ILLINOIS on May 13 was addressed by Roger P. Grange, an archaeologist on the staff of the Chicago Natural History Museum. Mr. Grange, who spent three seasons with a University of Kansas team making archaeological surveys of the plains country river basins which are likely to be inundated by flood control projects, spoke on the "Archaeology of the Middle Plains." Indians and their predecessors are known to have lived in the middle plains area for at least 12,000 years. Artifacts and other evidences of this early life are found in sites along river basins, many of which will be covered by water backed up by flood control dams.

*

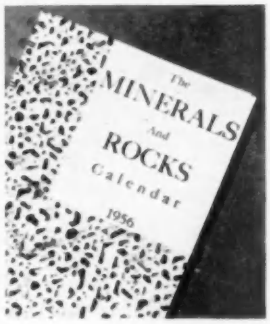
AKRON MINERAL SOCIETY held its annual exhibit of gems, crystals and rocks at the Akron Museum of Natural History, April 28 to May 8.

*

WISCONSIN GEOLOGICAL SOCIETY recently heard James Montague, Honorary Curator of Geology, Milwaukee Public Museum, speak on "The Growth of the Earth Science Movement in America." Mr. Montague outlined the evolution of the earth science clubs from early beginnings to their present national status. He also discussed the important part that youth is playing in these organizations.

NEWS OF OTHER SOCIETIES

NORTH LINCOLN AGATE SOCIETY will hold its 13th annual Agate Show in the DeLake Grade School on Highway 101, Oceanlake, Oregon, July 30-31. Visitors are cordially invited.



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GENUINE GEMS

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MIAMI MINERAL AND GEM SOCIETY'S bulletin, *Chips and Facets,* each month features on its cover an illustration of the birthstone of the month set in an exquisite piece of jewelry. The drawings appear to be hand painted and are true to the colors of the gem illustrated. The sketch of the gem setting is so detailed that a silversmith would easily be able to copy the beautiful design. Inside each issue is an excellent article by Amber Ekberg about the birthstone on the cover.

*

MAGIC VALLEY GEM CLUB OF SOUTHERN IDAHO will hold its fourth annual show July 16-17 in the Junior High School at Twin Falls, Idaho. This is an "Exhibitors' Show." Last year more than 100 club members showed one or more cases of Idaho gem materials, which include all varieties of agate, petrified woods and opals.

*

NATIONAL SPELEOLOGICAL SOCIETY'S Committee on Cave Biology announces the inauguration of an experimental identification service for society members who collect cave animals. The study of cave fauna is an important part of the natural history of caves, and NSS members can make worth while contribution to bio-speleology by careful collecting of cave animals and recording of their habits as observed in caves. A special leaflet, "Instructions on Collection and Preservation of Cave Animals," has been prepared, and is available on request. Write to Thomas C. Barr, Jr., Department of Biology, Vanderbilt University, Nashville 5, Tennessee.

*

SAN FRANCISCO GEM AND MINERAL SOCIETY will be host to the 16th Annual Convention of the California Federation of Mineralogical Societies, to be held in the San Francisco Auditorium, July 8-10. The convention, which is expected to be attended by more than 15,000 people, will feature the most comprehensive gem and mineral show ever seen in San Francisco, including exhibits from many foreign countries. Mayor Robinson of San Francisco has proclaimed that July 8 to July 10, 1955, will be "Mineralogical Days."

*

WICHITA GEM AND MINERAL SOCIETY, in answer to many requests from new exhibitors, makes the following suggestions on how to display minerals:

1. Select the best specimens of each type that you have, avoiding bruised or broken crystals, etc., as far as possible.
2. Wash clean, trim, and size specimens. Pliers or vise can be used in trimming. Consult books for details.
3. Label each specimen correctly. Learning about them is part of the value of a show.
4. Arrange specimens in a case in rows or groups for good effect. Be neat. Don't crowd case.
5. Background cloths and pedestrals may be used to give variety in displaying or to set off fine specimens.
6. A theme or central idea may be used to tie miscellaneous specimens together, e.g., minerals from one locality or state; or one type of minerals, such as carbonates; or ores of one metal.
7. If you lack quantity or variety, make an informative display out of what you have by preliminary study and use of of books, maps, printed information cards, etc.

*

WASATCH GEM SOCIETY recently heard geologist H. C. Lambert lecture on "The Colorado Plateau." Mr. Lambert illustrated his talk with beautiful color slides.

*

SAN DIEGO LAPIDARY SOCIETY recently made a field trip to old McPhaill Garnet Mine near Lakeside, California. Several pieces of garnets with good crystal faces and two to three inches in diameter were found by the group, but most of the garnets, however, were suitable only for specimens or baroques.

*

GEMOLOGICAL SOCIETY OF SAN DIEGO was formed on April 5, 1955. Its purpose is to further the study of gemology. It plans to furnish speakers, slides, etc., on the subject of gemology, to other societies, free of charge. Its members will also be available to identify gems at fairs, shows, etc. Anyone interested in gemology may join.

*

COMPTON GEM AND MINERAL CLUB held its Sixth Annual Gem Show on June 4-5, at the VFW Hall in Compton, California. The theme of the show was "Holiday in Gems." Each exhibitor was assigned a holiday to interpret in his display and the result was an imaginative show of great beauty and interest.

RECOMMENDED READINGS

"They Left Record," by H. L. Zollars, May and June issues of *The Voice.* An excellent description, complete with drawings, of the petroglyphs found in Canyon Diablo, Hudspeth County, Texas. Directions for locating this record of a prehistoric people, are also given.

*

" 'Herman,' Fossil Clue to Oil Riches," by Marian Rogers, June issue of *The Trilobite.* Fossils of ostracods which lived 500,000,000 years ago, are today a prime clue to petroleum treasure. The author particularly discusses the role of Herrmannella in pointing the way to oil deposits.

"How We Clean Copper," by Joe and Loretta Heininger, June issue of *Rock Rustlers News*. A short but informative item on how to bring out the innate beauty of copper specimens.

*

"Dealers Are Essential," by Charles Weidinger, April issue of the *Template*. Mr. Weidinger, a dealer, explains why dealers are the most reliable sources for gem materials.

(A mimeographed list of publications will be furnished on request by Club Editor.)

Most Valuable Gems

We often hear the remark made that the diamond is the most valuable of all precious gems. This is true only after a fashion, as a study of the following price list quoted by a leading State Street gem merchant will show:

Topaz, (Genuine Citrine Quartz), $3 per carat.
Diamonds, from $100 up to $6,000 per carat.
Emeralds, from $150 up to $1,800 per carat.
Rubies, from $75 up to $3,500 per carat.
Sapphires, from $50 up to $1,500 per carat.

From the above, some interesting observations may be made. In the first place, if these quotations are genuine, then the "first rater" diamond really tops the market. However, it will be seen that the lowest grade emerald rates 50% more valuable than the cheapest grade diamond. While the inferior grade rubies seem to be worth only half as much as the same class of emeralds, the highest grade rubies are worth practically double the highest grade emeralds. In all cases the sapphires seem to be at the bottom of the heap, the poorer grade being worth only half as much as the poorer diamond, and the best grade only one-fourth as much as the highest valued diamond.

It must be remembered that the above quotations reflect only the prices of a single merchant, and are not given as standard values elsewhere. Such values fluctuate widely from year to year, depending like other things upon the law of supply and demand, and upon the mass psychology of the people. While $3 per carat may seem to be quite a price to pay for quartz topaz, yet even that is some 2,000 times less than for the highest priced diamond.—B.H.W.

On request, Earth Science will furnish list of leading articles in back numbers that are available.

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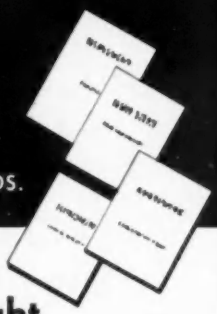

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